4.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the resources that would be affected by implementation of the alternatives analyzed in this EA. For each resource, the EA describes the current conditions at the site and then discusses how those resources would be affected by the alternatives. The impacts of the transportation of nonhazardous solid waste and sodium (for reuse) are also addressed; however, as noted in Chapter 2, impacts that could occur as a result of transportation of radioactive and hazardous waste from ETEC to offsite disposal sites have been addressed in prior NEPA documents and will not be addressed further here (*see* Section 2.4). DOE has included a discussion of air pollutant emissions as a result of transportation in response to public comments on the Draft EA. In addition, this chapter discusses the potential cumulative impacts of the cleanup activities proposed and analyzed in this EA and other ongoing or future site activities, including the cleanup of chemical contamination under RCRA.

4.1 LAND USE

4.1.1 Current Conditions

The ETEC complex of buildings is located on approximately 364,000 square meters (90 acres) within Area IV of the SSFL. Figure 4-1 shows the SSFL arrangement.

Undeveloped land surrounds most of the SSFL site. No significant agricultural land use, including prime or unique farmland, exists within 30 kilometers (19 miles) of the site. The location of the SSFL site in relation to nearby communities is shown in Figure 4-2. The community of Santa Susana Knolls lies 5 kilometers (3 miles) to the northeast of Area IV. The Bell Canyon area begins approximately 2.3 kilometers (1.4 miles) to the southeast, and the Brandeis-Bardin Institute is adjacent to the north. The closest residential portion of Simi Valley is 2.7 kilometers (1.7 miles) northwest of Area IV. The Santa Monica Mountains National Recreation Area, Malibu Creek State Park, and Topanga Canyon State Park are within 16 kilometers (10 miles) of the center of the SSFL, as are several state beaches; the Channel Islands National Park, Los Padres National Forest, Point Mugu State Park, Leo Carrillo State Park, Will Rogers State Historical Park, and additional state beaches are within 80 kilometers (50 miles) of the center of the SSFL. There are no wild and scenic rivers on or near the SSFL.

Although currently an industrial facility, future use of the property for residential purposes is probable. DOE has no control or authority over the future use of ETEC buildings, Area IV, or the SSFL.

4.1.2 Impacts of Alternative 1 (Cleanup and Closure With the 15 Millirem Annual Dose Standard)

Implementation of Alternative 1 would not affect current land uses at the site. Cleanup of Area IV the 15 mrem standard would allow future residential use of the site. There would be no impacts to prime or unique farmland, state or national parks, or wild and scenic rivers.

4.1.3 Impacts of Alternative 2 (Cleanup and Closure Using a 0.05-Millirem Annual Dose Standard)

Implementation of Alternative 2 would not affect current land uses at the site. Cleanup of Area IV to the 0.05-millirem standard would allow future residential use of the site. There would be no impacts to prime or unique farmland, state or national parks, or wild and scenic rivers.

Subdivisions			
Owner	**Jurisdiction**	**Acres**	**Subtotals**
Rocketdyne	Rocketdyne-Area IV	289.9	
	Rocketdyne	784.8	
	Rocketdyne (Undeveloped land)	1,324.6	2,399.3
Government	NASA (former AFP 57)	409.5	
	NASA (former AFP 64)	41.7	451.2
Total Acres			2,850.5

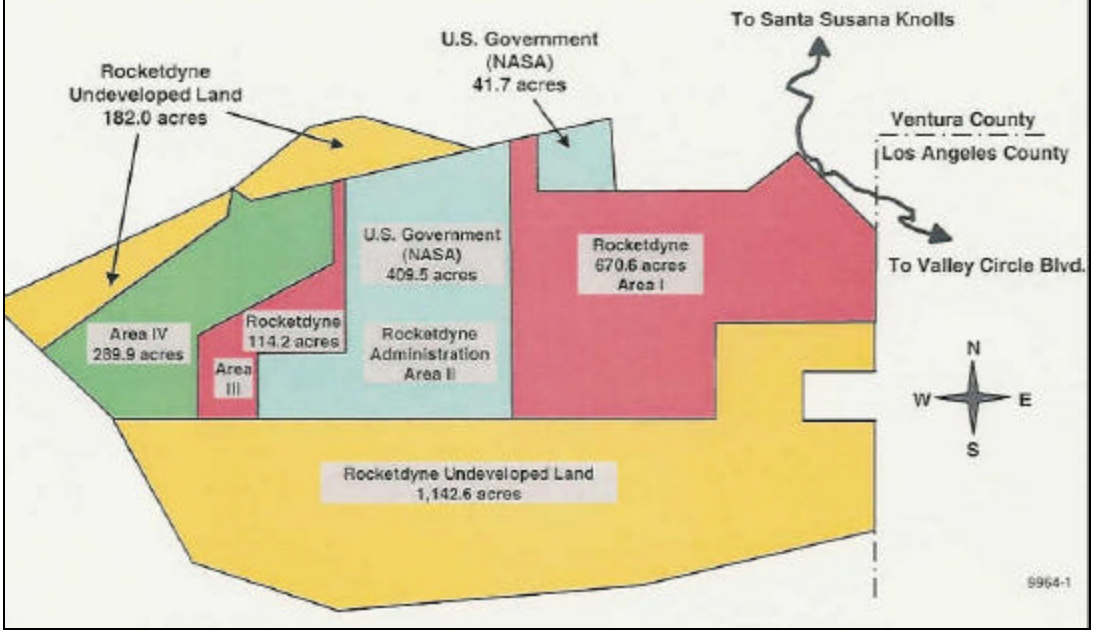

Figure 4-1. SSFL Arrangement

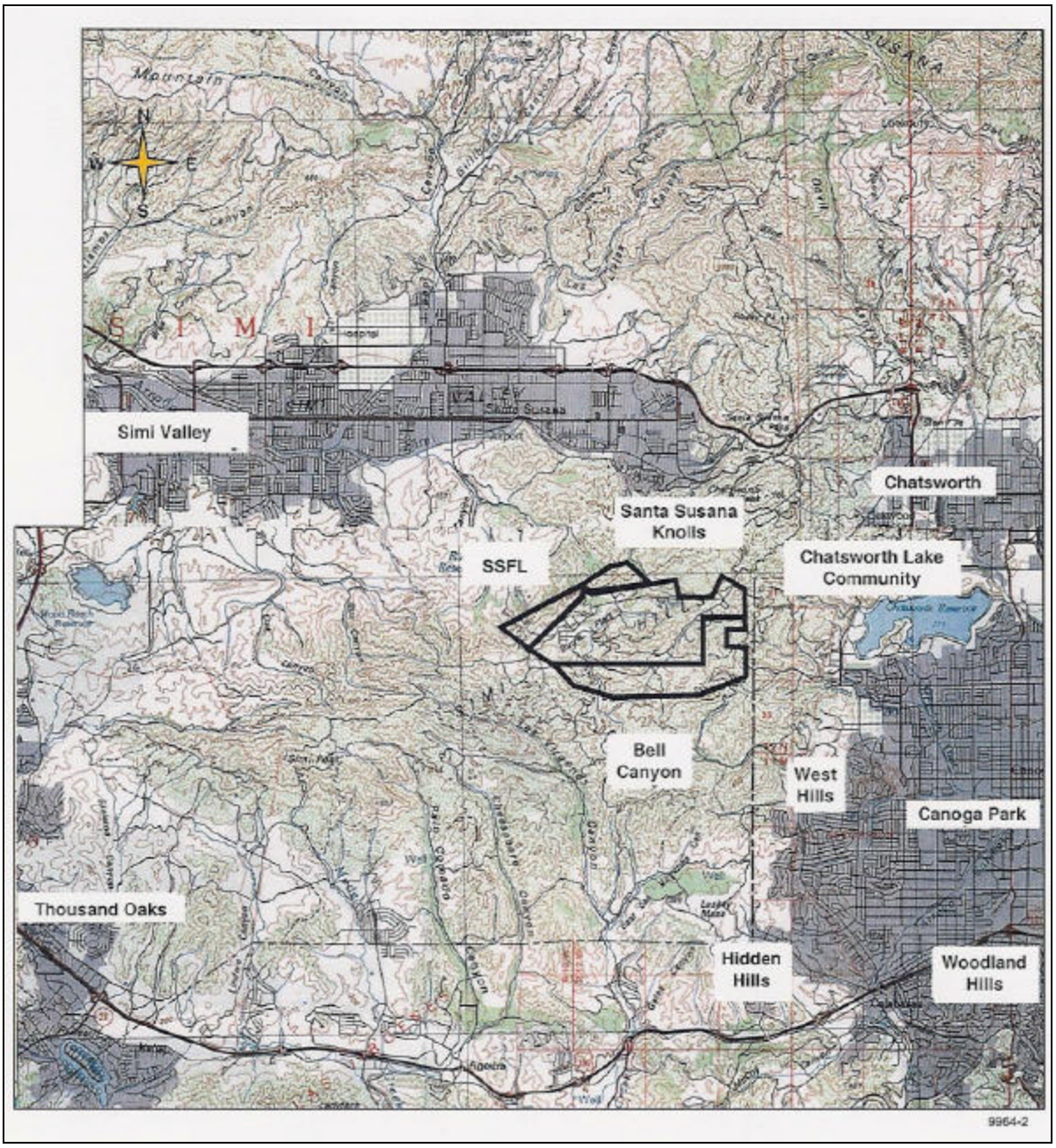

Figure 4-2. SSFL Location in Relation to Nearby Communities

4.1.4 Impacts of No Action Alternative (No Further Cleanup and Secure the Site)

Implementation of the No Action Alternative would not affect current land uses at the site. However, the site would not be available for any other purposes until such time as residual radioactive contamination fell within acceptable standards. (With the exception of the RMHF, much of the soil in Area IV is already at a theoretical risk level of zero to 1.8×10^{-6} (0.09 mrem/yr), with small regions as high as 2×10^{-5} (1 mrem/y dose). Even at the RMHF, which is yet to be remediated, soil has an average theoretical risk level of 1.5×10^{-4} (7.5 mrem/y dose) less than the 3×10^{-4} (15 mrem/y dose) standard of Alternative 1.) However, implementation of DOE's ALARA (As Low as Reasonably Achievable) principle dictates that DOE remediate the three remaining contaminated facilities.

4.2 GEOLOGY AND SOILS

4.2.1 Current Conditions

The SSFL is part of the Chatsworth Formation, which is composed of poorly to well-cemented massive sandstone with interbeds of siltstone and claystone. It is situated on rocky terrain and occupies an upland area known as Burro Flats, which sits at the crest of the Simi Hills, near their eastern end. Area IV is between 570 meters (1,880 feet) and 660 meters (2,150 feet) above sea level and is relatively flat. Its overlying soils consist of weathered bedrock and alluvium (unconsolidated sand, silt, and clay materials that have been eroded primarily from the surrounding Chatsworth and Martinez Formations). Several geologic faults traverse the site.

Radiological Contamination. Soil radioactivity at ETEC is due to various naturally occurring radionuclides present in the environment, radioactive fallout of dispersed nuclear weapons materials from offsite locations, and nuclear reactor and other operations in ETEC facilities. The radionuclide composition of local area surface soil has been determined to be predominantly potassium-40, natural thorium, natural uranium, and their decay progeny. Radioactivity in the soil from nuclear weapons test fallout consists primarily of strontium-90, cesium-137, and plutonium-239. In soil sampling done in 2000, only trace amounts of cesium-137 (a man-made radionuclide) were detected, in addition to naturally occurring potassium-40 and uranium and thorium decay products. The maximum observed cesium-137 concentration was 53 picocuries/gram, from one soil sample taken near the RMHF in 2000 (the highest concentration of cesium-137 in soil samples taken from other locations on Area IV in 1995 was 2.4 picocuries/gram). An individual who was exposed to the maximum observed concentration of 53 picocuries/gram level of contamination in a residential lot, to a depth of 1 meter (3.3 feet) for 40 years would experience an additional theoretical lifetime cancer risk of 1.7×10^{-3}.[10] An individual who was exposed to the maximum observed concentration of 2.4 picocuries/gram would experience an additional theoretical lifetime cancer risk of 7.2×10^{-5}. *See Appendix G for further discussion of risk from soil contamination at Area IV.*

Potassium-40

Potassium-40 is a naturally occurring radionuclide present at the site. It is not a regulated material. Soil sampling conducted by DOE in and around ETEC has not found any significant difference between the concentration of potassium-40 in onsite and offsite samples (Boeing 2000b).

Chemical Contamination. The RCRA Facility Investigation Program started at the SSFL in 1996 and is ongoing. The primary objectives of the program are to (1) investigate the nature and extent of chemicals in the soil and the potential threat to groundwater, and (2) evaluate the potential risk to human health and the

[10] Naturally occurring radionuclides in uncontaminated soil result in an annual exposure to individuals of between 30 and 50 millirem. This results in a lifetime theoretical fatal cancer risk of 6×10^{-4} to 1×10^{-3}.

environment and assess whether remediation is required. Soil sampling conducted for the RCRA Facility Investigation Program revealed areas on the SSFL with elevated levels of petrochemicals (diesel fuel, lubricants, oil, and grease), solvents, metals, and other chemicals. All remediation of chemical contamination on the SSFL, including ETEC, will be conducted under the RCRA process and is not analyzed in this EA.

4.2.2 Impacts of Alternative 1 (Cleanup and Closure Under 15 mrem Annual Dose Standard)

Implementation of Alternative 1 would reduce radiological contamination in the soil such that the maximally exposed individual would experience no more than an annual 15-millirem additional radiation dose from all exposure pathways (air, soil, groundwater). Alternative 1 would have no impact on the general terrain because the area would be regraded with clean soil from the onsite borrow area. Implementation of the ALARA process under Alternative 1 ensures that post-remedial doses will be much less than 15 mrem/year.

4.2.3 Impacts of Alternative 2 (Cleanup and Closure Using a 0.05-Millirem Annual Dose Standard)

Implementation of Alternative 2 would reduce radiological contamination in the soil such that the maximally exposed individual would experience no more than an annual 0.05-millirem additional radiation dose from all exposure pathways (air, soil, groundwater). Similar to Alternative 1, implementation of Alternative 2 would require excavation of soil on Area IV, but the volume of soil would be much greater. Because the area would be regraded with clean soil from off the site, implementation of Alternative 2 would have no impact on the general terrain.

4.2.4 Impacts of No Action Alternative (No Further Cleanup and Secure the Site)

Implementation of the No Action Alternative would leave existing radiological contamination in place. *See* Appendix G for a discussion of the range of theoretical risk from soil in Area IV.

4.3 AIR QUALITY

4.3.1 Current Conditions

In compliance with the Clean Air Act, 42 U.S.C. 7401 *et seq.*, the EPA has promulgated National Primary and Secondary Ambient Air Quality Standards for six air pollutants that are responsible for most air pollution (40 CFR Part 50). These are known as criteria air pollutants. They are carbon monoxide, sulfur dioxide, particulate matter, ozone, nitrogen oxide, and lead.

Air pollutant discharge limitations at the SSFL are imposed by the Ventura County Air Pollution Control District rules and regulations and a Permit to Operate, which is kept current and renewed each year by the district. ETEC does not emit lead, and all other emissions of criteria air pollutants at the SSFL are below applicable permit limits.

Further, EPA has promulgated regulations for hazardous air pollutants and has established a 10-millirem dose limit per year from airborne releases of radionuclides (40 CFR Part 61, Subpart H). The ETEC radiological monitoring program measures radioactive emissions from point sources (emission stacks). At the end of each year, the air samples for the entire year are combined and analyzed for specific radionuclides. The results are used to estimate the potential offsite dose to the maximally exposed member of the public from the air pathway. The results of the air emissions monitoring at ETEC for the last 5 years show that the annual radiation dose to the maximally exposed individual for the air pathway range from

none to 0.00013 millirem. Potential health impacts from the radioactive air emissions are addressed in Section 4.5. DOE implements mitigation measures such as dust suppression, sediment controls, personnel protective equipment, monitoring, and compliance with safety and health plans to reduce radiation exposure to workers and the public through the air pathway. Table 4-1 shows the results of the air emissions monitoring at ETEC for the last 5 years. Potential health impacts from the radioactive air emissions are addressed in Section j4.5. DOE implements mitigation measures such as dust suppression, sediment controls, personnel protective equipment, monitoring, and compliance with safety and health plans to reduce radiation exposure to workers and the public through the air pathway.

Table 4-1. Results of Radioactive Air Emissions Monitoring, 1996 – 2000

Year	Annual Radiation Dose to Maximally Exposed Individual – Air Pathway (Point Sources)[a]	Annual Radiation Dose to Maximally Exposed Individual – Air Pathway (Area Sources)[b]	Average Annual Background Radiation Dose to an Individual (All Sources)	Annual Population Dose[c] – Air Pathway (Point Sources)	Annual Population Dose[c] – Air Pathway (Area Sources)	Average Annual Population Dose Resulting from Background Radiation (All Sources)
1996	4.6×10^{-6} millirem	1.3×10^{-4} millirem	300 millirem	6.4×10^{-3} person-rem	5.1×10^{-3} person-rem	3 million person-rem
1997	2.7×10^{-6} millirem	1.6×10^{-4} millirem	300 millirem	6.8×10^{-4} person-rem	6.2×10^{-3} person-rem	3 million person-rem
1998	1.3×10^{-6} millirem	2.5×10^{-3} millirem	300 millirem	2.9×10^{-4} person-rem	8.5×10^{-2} person-rem	3 million person-rem
1999	2.2×10^{-7} millirem	6.6×10^{-7} millirem	300 millirem	4.8 x 10-^{5} person-rem	4.7×10^{-5} person-rem	3 million person-rem
2000	7.7×10^{-7} millirem	None	300 millirem	2.2×10^{-4} person-rem	None	3 million person-rem

a. Point sources are monitored exhaust stacks from the Hot Laboratory (now decontaminated and demolished), Building 4024, and the RMHF. There is a 10-millirem-per-year dose limit on radionuclide air emissions from point sources. *See* 40 CFR Part 61, Subpart H.

b. Area sources at ETEC are sources of windborne resuspension of radioactively contaminated soil. These are the RMHF sump (when dry), Building 4064 Side Yard before remediation, Building 4020 yard soil before remediation, and the 17th Street Drainage Area site. The emissions from area sources cannot be measured and are estimated using conservative assumptions and a computer modeling calculation. Reporting this source is not a regulatory requirement.

c. Total dose to population within 80 kilometers (50 miles) of SSFL.

Sources: National Emission Standards for Hazardous Air Pollutants – Radionuclides Reports for 1996 through 2000 (Boeing Rocketdyne 1997-2001); 1996 Annual Site Environmental Report (DOE 1997d).

4.3.2 Impacts of Alternative 1 (Cleanup and Closure Under the 15 mrem Annual Dose Standard)

Implementation of Alternative 1 would result in increases in emissions of hydrocarbons, carbon monoxide, nitrogen oxide, and particulate matter from the operation of machinery on the site for demolition and offsite transportation of waste. These emissions would be temporary, would not exceed any permit limits for the site, and would not significantly affect air quality in the area or in the region.

Demolition and soil removal activities could also result in fugitive dust emissions. DOE would use dust suppression techniques such as spraying water to reduce fugitive dust emissions to the extent possible. In

addition, land clearing, filling, grading, earth moving, or excavation activities would cease during periods of high winds to prevent excessive amounts of fugitive dust.

Table 4-2 shows the projected volume of air pollutant emissions from soil excavation and transportation of wastes and soil to authorized disposal areas under Alternative 1. The annual emissions listed in Table 4-2 are below the thresholds for all pollutants. *See* Appendix H for additional information on the air quality analysis, including a conformity review.

Table 4-2. Air Pollutant Emissions for Soil Excavation and Transportation Activities Under Alternative 1

Activity	Air Pollutants (in tons)			
	Hydrocarbons	Carbon Monoxide	Nitrogen Oxide	Particulate Matter
Soil Excavation				
Annual	0.38	0.78	5.4	0.38
Transportation				
Annual	0.15	0.75	0.47	0.016
Total (5 years)	0.53	1.53	5.87	0.4
Threshold Annual Emission Rates (depending on area air quality classification)	10 – 100	100	10 – 100	100

Radionuclide emissions could also increase slightly (*see* Section 4.5.2), but no higher than they have been in previous years when radiologically contaminated facilities were decontaminated and demolished. DOE would continue to implement mitigation measures such as dust suppression, sediment controls, personnel protective equipment, monitoring, and compliance with safety and health plans to reduce radiation exposure to workers and the public through the air pathway. Potential doses from the decontamination of the radiological facilities and soil under Alternative 1 are described in Section 4.5, Human Health.

4.3.3 Impacts of Alternative 2 (Cleanup and Closure Using a 0.05-Millirem Annual Dose Standard)

Implementation of Alternative 2 would also result in increases in emissions of criteria air pollutants from the operation of machinery on the site for demolition and offsite transportation of waste. These emissions would be temporary, would not exceed any permit limits for the site, and would not significantly affect air quality in the area or in the region. Emissions of criteria air pollutants from the operation of machinery would continue for 3 years longer than under Alternative 1 because of the additional soil remediation and transportation that would occur under Alternative 2. Demolition and soil removal activities could also result in fugitive dust emissions. DOE would use dust suppression techniques such as spraying water to reduce fugitive dust emissions to the extent possible. In addition, land clearing, filling, grading, earth moving, or excavation activities would cease during periods of high winds to prevent excessive amounts of fugitive dust. Because more soil would be removed under Alternative 2 than under Alternative 1, the potential for fugitive dust emissions and the level of those emissions would be greater under Alternative 2 than under Alternative 1.

Because more soil would be excavated under Alternative 2, emissions of air pollutants from the operation of machinery would be correspondingly higher. Table 4-3 shows the amount of air pollutant emissions that would occur as a result of soil excavation and transportation under Alternative 2. Compared to the completion of Alternative 1 activities, Alternative 2 will result in the production of 744.1 additional tons of

priority air pollutants and particulate matter. The annual emissions listed in Table 4-3 are below the thresholds for all pollutants except for nitrogen oxide; nitrogen oxide emissions would exceed the threshold for serious (50 tons allowed per year), severe (25 tons allowed per year), and extreme (10 tons allowed per year) nonattainment areas for ozone. *See* Appendix H for additional information on the air quality analysis.

Table 4-3. Air Pollutant Emissions for Soil Excavation and Transportation Activities Under Alternative 2

Activity	Air Pollutants (in tons)			
	Hydrocarbons	Carbon Monoxide	Nitrogen Oxide	Particulate Matter
Soil Excavation				
Annual	2.9	7.6	52.3	3.3
Transportation				
Annual	3.5	17	11	0.37
Total (8 years)	6.4	24.6	63.3	3.67
Threshold Annual Emission Rates (depending on area air quality classification)	10 – 100	100	10 – 100	100

Alternative 2 would result in annual radionuclide emissions similar to those under Alternative 1, but the potential for emissions would continue for 3 years longer because of the additional soil remediation required. DOE would continue to implement mitigation measures such as dust suppression, sediment controls, personnel protective equipment, monitoring, and compliance with safety and health plans to reduce radiation exposure to workers and the public through the air pathway. Potential doses from the decontamination of the radiological facilities and soil under Alternative 2 are described in Section 4.5, Human Health.

4.3.4 Impacts of No Action Alternative (No Further Cleanup and Secure the Site)

Implementation of the No Action Alternative would result in continued releases of radioactive air emissions at very low levels. In 2000, the total air emissions were 7.7×10^{-7} millirem (*see* Table 4-1). Because no soil excavation would occur, there would be no air quality impacts as a result of the operation of machinery for this purpose.

4.4 WATER QUALITY AND WATER RESOURCES

4.4.1 Current Conditions

Water resources on the SSFL consist of (1) a shallow groundwater system that exists in the surficial alluvium at small, isolated locations, and (2) a deeper regional groundwater system in the fractured Chatsworth Formation. There are no natural surface waters on the site, although portions of the site become saturated during and immediately following the wet season in the winter months. Because of its elevation, Area IV is not within a floodplain.

Groundwater. Forty-seven wells in and around Area IV are used to monitor water levels and to monitor the condition of the groundwater (including concentrations of chemicals and/or radioactivity released by DOE operations). Past ETEC operations resulted in chemical and radiological contamination of groundwater onsite. A Groundwater Monitoring Program has been established to detect the presence of

volatile organic compounds, base/neutral and acid extractable organic compounds, petroleum hydrocarbons, trace metals and common ion constituents, and radiological constituents.

The major chemical groundwater contaminant at the site is TCE. TCE is a dense liquid that does not dissolve easily in water. Though it is not very soluble, TCE can dissolve somewhat in groundwater, and even at low concentrations can be toxic if ingested over a long period of time. This solution can be transported by groundwater through the fractured Chatsworth formation sandstone.

Groundwater remediation through pumping and treating has been under way since 1994 to reduce contamination in groundwater and prevent contamination plumes from migrating beyond site boundaries. Data have also been collected to refine the understanding of groundwater movement and contaminant migration and to evaluate possible continuing releases from historically contaminated soil and sediment.

Radioactivity concentrations in groundwater at SSFL are below drinking water standards. Laboratory analyses were performed for tritium in 43 water samples from 26 groundwater-monitoring wells. Of the 43 analyses performed, seven samples from four onsite wells had tritium concentrations higher than the detection limits. The maximum value among all the results was far below the EPA and California drinking water limit. No offsite wells show the presence of tritium. The occurrence of tritium in groundwater appears to have resulted from formation of tritium in the reactor shielding in Building 4010, which has been decontaminated, released for unrestricted use, and subsequently demolished. Prior to removal, tritiated water migrated from the concrete into the surrounding soil and subsequently into the groundwater.

Surface Water. Most of Area IV slopes toward the southeast. Rainfall runoff is collected by a series of drainage channels and accumulates in an onsite retention pond beyond the Area IV boundary. Influent to the retention pond includes tertiary treated domestic sewage, cooling water from various testing operations, and treated groundwater and stormwater runoff. Water from the pond is eventually released to Bell Creek (a tributary of the Los Angeles River) under an NPDES permit issued pursuant to the Clean Water Act, 33 U.S.C. 1251 *et seq*.

Some of Area IV slopes to the northwest, and a small amount of rainfall drains toward the northwest ravines, which lead into Meier Canyon. To permit sampling of this runoff, five catch basins were installed in 1989 near the site boundary to accumulate Area IV runoff from the northwest portion of the site.

DOE routinely monitors all water outfalls. Since 1989, this monitoring has found no indication of any radiological contamination of surface water discharges, and all monitoring results have been below the drinking water supplier limits established in the NPDES permit. Mercury, antimony, copper, and cadmium have been found at levels above acceptable guidelines. DOE has taken measures such as installing sediment control structures, replacing equipment, and cleaning an outside storage area to bring the levels of these chemicals to within permitted levels. Ultimately, the releases will be controlled by the restoration of the areas that are the source of the contamination.

Wetlands. Pursuant to Section 404 of the Clean Water Act, 33 U.S.C. 1344, the U.S. Army Corps of Engineers regulates the "discharge of dredged or fill material" into "waters of the United States," which includes tidal waters, interstate waters, and all other waters that are part of a tributary system to interstate waters or to navigable "waters of the United States." In addition, the California Department of Fish and Game regulates activities within wetlands under California state law (Fish and Game Code Section 1600-1607). Approximately 157,826 square meters (39 acres) of drainages on the SSFL meet the U.S. Army Corps of Engineers definition of "waters of the United States," of which approximately 60,700 square meters (15 acres) are jurisdictional wetlands (PCR 2001). Approximately 360,167 square meters (89 acres) of drainages are streambed and associated riparian habitat identified by the California Department of Fish

and Game. Any impacts to jurisdictional waters on the SSFL would require authorization from the U.S. Army Corps of Engineers or the California Department of Fish and Game.

4.4.2 Impacts of Alternative 1 (Cleanup and Closure Under the 15 mrem Annual Dose Standard)

Implementation of Alternative 1 would not affect water quality or water resources. None of the activities would result in releases of radioactively contaminated liquid effluents or any impacts to jurisdictional waters, including wetlands, on the SSFL.

4.4.3 Impacts of Alternative 2 (Cleanup and Closure Using a 0.05-Millirem Annual Dose Standard)

Implementation of Alternative 2 would not affect water quality or water resources. None of the activities would result in releases of radioactively contaminated liquid effluents or any impacts to jurisdictional waters, including wetlands, on the SSFL.

4.4.4 Impacts of No Action Alternative (No Further Cleanup and Secure the Site)

Implementation of the No Action Alternative would not affect water quality or water resources. Continuous monitoring has revealed no groundwater or surface water radiological contamination (with the exception of localized tritium onsite at levels below drinking water standards) that resulted from nuclear operations at ETEC and Area IV. Because institutional controls would be maintained onsite, no radiological releases to groundwater or surface water would be expected.

4.5 HUMAN HEALTH

4.5.1 Current Conditions

Radioactive and chemical contamination in the soil, radioactive air emissions, and radioactive and chemical contamination in water resources (as described in Sections 4.2.1, 4.3.1, and 4.4.1, above) have resulted in public and worker exposure to very low levels of radiation and hazardous chemicals. As documented in the *Site Environmental Report for Calendar Year 2000* (DOE 2001b) issued for DOE operations at ETEC, exposure of the maximally exposed member of the public to radiation from all pathways (internal and external) was estimated to be 7.7×10^{-7} millirem per year. Based on current internationally recognized risk factors, this dose results in 3.9×10^{-13} latent cancer fatality risk annually. For the population within 80 kilometers (50 miles) of the site, ETEC activities in 2000 resulted in a release of 2.2×10^{-4} person-rem. This dose results in 1.1×10^{-7} latent cancer fatalities annually in a population of approximately 10 million.

Radionuclides of Concern

The radionuclides of concern at ETEC are uranium-238, thorium-232, strontium-90, cobalt-60, cesium-137, and tritium. Other radionuclides present in soil samples taken in and around ETEC are either from naturally occurring sources or global fallout. Of the five radionuclides of concern, only cesium-137 has a maximum observed concentration exceeding 10 percent of the 15 mrem/yr. soil release criteria. If the maximum observed concentration of a radionuclide is below 10 percent of the release criteria, it is highly unlikely that this radionuclide would pose any risk to the public or the environment. For this reason, the public and worker exposure estimates are based on exposures to cesium-137, which is considered to be the primary radiological risk driver at ETEC. *See* Appendix F for additional information.

For workers, the average measured radiation exposure that an individual worker received at ETEC in 2000 was 7 millirem. This is 0.35 percent of the annual 2,000-millirem administrative control limit for radiation workers at ETEC. It also represents a probability of a latent cancer fatality to a worker of about 3 in 1 million.

Approximately 197,000 liters (52,000 gallons) of nonradioactive metallic sodium are present onsite in the SPTF. Although a hazardous material, the sodium is not a contaminant and is currently in safe storage awaiting reuse.

Human Health Effects Methodology

To estimate the *public* doses and potential human health effects resulting from the implementation of Alternatives 1 and 2, DOE averaged site air emissions data from 1996-1998 when DOE decontaminated and demolished the Hot Laboratory and remediated the radioactively contaminated soil surrounding the building. This laboratory was built in 1959 and operated until 1988. It was a 1,500-square-meter (16,000-square-foot) facility and had four large hot cells with remote manipulators and cranes. It was used to handle and examine highly radioactive items such as used reactor fuel assemblies and other test specimens. It was also used to manufacture sealed radioactive sources, do leak checks on sources, and do cutting and machining operations on radioactive cobalt-60.

DOE assumed that public exposure resulting from the decontamination, demolition, and soil remediation for the Hot Laboratory that occurred in 1996-1998 would be similar to the expected exposure for the RMHF, Building 4059, and Building 4024. To be conservative (that is, to overestimate the potential environmental impacts), DOE assumed that all three buildings would be decontaminated and demolished at the same time and that exposure to radiation from each of these facilities would be the same as for the Hot Laboratory. Therefore, DOE multiplied the average dose resulting from the decontamination, demolition, and soil remediation of the Hot Laboratory by three to conservatively estimate the impacts of decontamination, demolition, and soil remediation at the RMHF and Buildings 4059 and 4024.

To estimate *worker* doses and potential health effects, DOE averaged site worker exposure data from 1991 and 1992. These doses were the highest reported over the last 10 years.

To estimate the potential health effects of the No Action Alternative for the public and workers, DOE used the site air emissions data for 2000.

Exposure data were derived from ETEC Annual Site Environmental Reports (DOE 1997d; 2000b; 2001b); National Emission Standards for Hazardous Air Pollutants Annual Reports (Boeing Rocketdyne 1997-2001), and DOE's Radiation Exposure Monitoring System (DOE 2001c). For more information on radiation and human health, *see* Appendix C.

The major chemical groundwater contaminant at the site, TCE, can be toxic even at low concentrations. Other chemical groundwater contaminants are petrochemicals (diesel fuel, lubricants, oil, and grease), copper, and lead. Mercury, antimony, copper, and cadmium have also been found in surface water at levels slightly above permitted guidelines. The potential health risks of the chemical contamination and all remediation of chemical contamination on the SSFL are being addressed under the RCRA process.

4.5.2 Impacts of Alternative 1 (Cleanup and Closure Under the 15 mrem Annual Dose Standard)

Radiological Impacts to the Public. Implementation of Alternative 1 would result in an annual 2.8×10^{-3} millirem dose to the maximally exposed member of the public through the air pathway (no exposure would be expected through any other pathway). This exposure would result in 1.4×10^{-9} latent cancer fatality risk. The total dose to this individual over the 5-year duration of the alternative would be 1.4×10^{-2} millirem, which would result in 7.0×10^{-9} latent cancer fatality risk.

The maximum additional annual dose to the public within 80 kilometers (50 miles) of the site would be 0.11 person-rem. This would result in 5.6×10^{-5} latent cancer fatalities within this population of approximately 10 million. The total dose to the public for the 5-year duration of the alternative would be 0.56 person-rem, which would result in a maximum of 2.8×10^{-4} latent cancer fatalities within the population during that time period.

Following cleanup, a person residing on the site for 40 years would be exposed to a maximum additional total of 600 millirem, which would result in 3×10^{-4} latent cancer fatality risk over that period. A site population of 500 people would receive a total of 300 person-rem over 40 years, resulting in 0.15 latent cancer fatalities within the population residing on the site for that period of time. For comparison purposes, this population would be expected to incur approximately 3 latent cancer fatalities as a result of exposure to background radiation during this time period.

Radiological Impacts to Workers. Implementation of Alternative 1 would result in an annual 470-millirem dose to the average worker. This exposure would result in 1.9×10^{-4} latent cancer fatality risk. The total dose to this individual over the 5-year duration of the alternative would be 2,345 millirem, which would result in 9.4×10^{-4} latent cancer fatality risk.

Proposition 65 Applicability to the ETEC Cleanup

In November 1986, California voters approved the "Safe Drinking Water and Toxic Enforcement Act of 1986," better known as Proposition 65. Proposition 65 requires the California Governor to publish a list of chemicals that are known to cause cancer, birth defects, or other reproductive harm. Proposition 65 prohibits releases of those chemicals into sources of drinking water, and requires that responsible entities warn consumers, employees, and the public prior to exposing them to listed chemicals at levels exceeding a "no significant risk" level. Radioactive materials are included in the Proposition 65 list as "radionuclides." To date, ETEC closure activities have not resulted in the release of materials at a level sufficient to warrant warnings to the public.

The annual dose to the worker population at ETEC would be 10.3 person-rem. This would result in 4.1×10^{-3} latent cancer fatalities within this population. The total dose to the worker population for the duration of the alternative would be 52 person-rem, which would result in 2.1×10^{-2} latent cancer fatalities within the ETEC worker population.

Sodium Removal. Based on past experience with removal of sodium from the Sodium Component Test Installation and other former sodium facilities, removal of the nonradioactive sodium from the SPTF would not result in any human health impacts under routine operations. The impacts of a potential accident during the removal process are addressed below.

Facility Accidents. Implementation of Alternative 1 could result in industrial accidents at the three radiological facilities, the one sodium facility (SPTF), or the other uncontaminated support buildings. These accidents could consist of (1) accidents that are typical of industrial settings, or (2) accidents that involve the radioactive or sodium materials in the buildings being decontaminated and demolished.

Under Alternative 1, no worker fatalities (5.2×10^{-3} fatalities) would be expected as a result of industrial accidents.

DOE also analyzed a potential accident in the RMHF to estimate radiological impacts to members of the public and workers. In the bounding accident (the accident that would have the highest consequences), which would be a fire involving radioactive materials, the maximally exposed individual member of the public would receive a 7-millirem dose, resulting in a 3.5×10^{-6} probability of incurring a latent cancer fatality. The radiation dose to the population within 80 kilometers (50 miles) of the site would be 990 person-rem, resulting in 0.5 latent cancer fatalities within a population of 10 million people. A worker located 100 meters (330 feet) from the accident would receive a 1,700-millirem dose (1.7 rem). This

would result in a 7.0 x 10^{-4} probability of incurring a latent cancer fatality. An accident involving radiological materials at Buildings 4059 and 4024 would have fewer impacts because the radiological inventory at those buildings is far less than that in the RMHF. The probability that such an accident could occur at any of the radiological facilities is low, given the existence of alarms, smoke detectors, sprinkler systems, and fire extinguishers within the facilities.

Sodium is highly reactive. Thus, an accident involving the removal of sodium from the SPTF into portable transfer vessels could result in serious injuries or death to workers located near the site of the accident, but no public health effects would be expected.

4.5.3 Impacts of Alternative 2 (Cleanup and Closure Using a 0.05-Millirem Annual Dose Standard)

Radiological Impacts to the Public. Implementation of Alternative 2 would result in the same annual dose to the maximally exposed member of the public as under Alternative 1. However, because implementation of Alternative 2 would take 8 years, rather than 5 under Alternative 1, the total dose would be larger.[11] The total dose to this individual over the 8-year duration of the alternative would be 2.2 x 10^{-2} millirem, which would result in 1.1 x 10^{-8} probability of a latent cancer fatality.

The annual dose to the public within 80 kilometers (50 miles) of the site would be the same as under Alternative 1. The total dose to the public for the 8-year duration of the alternative would be 0.9 person-rem, which would result in 4.5 x 10^{-4} latent cancer fatalities within the population during that time period.

Following cleanup, a person residing on the site for 40 years would be exposed to a total of 2.0 millirem, which would result in 1 x 10^{-6} latent cancer fatality risk. A site population of 500 people would receive a total of 1.0 person-rem over 40 years, resulting in 5 x 10^{-4} latent cancer fatalities within the population residing on the site for that period of time. For comparison purposes, this population would be expected to incur approximately 3 latent cancer fatalities as a result of exposure to background radiation.

Radiological Impacts to Workers. Implementation of Alternative 2 would result in the same annual dose to the average worker as under Alternative 1. However, the total dose would be larger because of the longer duration of Alternative 2 as compared to Alternative 1. The total dose to this individual over the 8-year duration of Alternative 2 would be 3,760 millirem, which would result in 1.5 x 10^{-3} probability of a latent cancer fatality.

The annual dose to the worker population at ETEC would be the same as under Alternative 1. The total dose to the worker population for the 8-year duration of the alternative would be 82 person-rem, which would result in 3.3 x 10^{-2} latent cancer fatalities within the ETEC worker population.

Sodium Removal. Based on past experience with removal of sodium from the Sodium Component Test Facility and other former sodium facilities, removal of the liquid sodium from the SPTF would not result in any human health impacts under routine operations.

Facility Accidents. Implementation of Alternative 2 could result in the same type of accidents as could occur under Alternative 1. The consequences of a radiological or sodium accident would be the same as

[11] Once decontamination and demolition of the radiological facilities were completed, potential doses to the public and to workers would end. However, to determine the doses to the public and workers from soil remediation alone would require complex modeling. Because the doses are already minute, and for ease of analysis, DOE simply assumed – conservatively – that the doses to the public and to workers from decontamination, demolition, and soil remediation would continue for the entire 8-year duration of Alternative 2.

described under Alternative 1. Because more soil remediation would occur under Alternative 2 than under Alternative 1, the potential for industrial accidents at the site would increase, although no fatalities (6.5×10^{-3} fatalities) would be expected as a result of industrial accidents.

4.5.4 Impacts of No Action Alternative (No Further Cleanup and Secure the Site)

Radiological Impacts to the Public. Based on exposures experienced in 2000, implementation of the No Action Alternative would result in an annual 7.7×10^{-7} millirem dose to the maximally exposed member of the public. This exposure would result in 3.9×10^{-13} probability of a latent cancer fatality. The annual dose to the public within 80 kilometers (50 miles) of the site would be 2.2×10^{-4} person-rem. This would result in 1.1×10^{-7} latent cancer fatalities within this population. These annual impacts would occur indefinitely.

Radiological Impacts to Workers. Implementation of the No Action Alternative would result in an annual 7-millirem dose to the average worker. This exposure would result in 2.8×10^{-6} probability of a latent cancer fatality. The annual dose to the worker population at ETEC would be 0.92 person-rem. This would result in 3.7×10^{-4} latent cancer fatalities within the worker population. These annual impacts would occur indefinitely.

Sodium Removal. Implementation of the No Action Alternative would cause the residual sodium to remain onsite. This material would be maintained in its solid state. Abandonment of the facility and the sodium would cause the sodium to be regulated as hazardous waste, and removal of the sodium would be required.

Facility Accidents. Implementation of the No Action Alternative would not be expected to result in any fatalities due to accidents because no decontamination, demolition, or soil remediation activities would be conducted and institutional controls would be maintained.

4.6 BIOLOGICAL RESOURCES

4.6.1 Current Conditions

The undeveloped areas within the SSFL site, both in open space and in the natural areas surrounding the developed site areas, consist of a large area of diverse habitats. This diversity is reflected in a wide variety of plants and animals at the site. The habitat and species diversity associated with the SSFL property, the physical attributes of the facility, and its geographic location make the area a potentially important route for effective movement of species. The open space at the site may play an important role as a habitat linkage between the Santa Susana Mountains, the Simi Hills, and possibly the Santa Monica Mountains.

Appendix D identifies the sensitive species observed or potentially occurring at the SSFL site (plants; reptiles; aquatic, amphibian, and insect species; birds; and mammals). Species are designated as sensitive because of their overall rarity, status, unique habitat requirements, and/or restricted distribution. Sensitive species include those listed by the U.S. Fish and Wildlife Service under the Endangered Species Act, 16 U.S.C. 1531 *et seq.*, or the California Department of Fish and Game under state preservation laws as threatened or endangered, protected, rare, candidate species, special animals, species of special concern, or harvest species.

Of those that could occur at the SSFL, several have been observed in surveys of the area. These are as follows:

- Santa Susana tarplant (state sensitive species)

- Southern California black walnut (candidate state sensitive species)
- Braunton's milkvetch (federal endangered and candidate state sensitive species)
- Two-striped garter snake (state special animal)
- Double-crested cormorant (state species of special concern)
- Great blue heron (state special animal)
- Southern California rufous-crowned sparrow (state species of special concern)
- Loggerhead shrike (state species of special concern)
- Sharp-skinned hawk (state species of special concern)
- Cooper's hawk (state species of special concern)
- Bobcat (state harvest species)
- Mule deer (state harvest species)
- San Diego black-tailed jackrabbit (state species of special concern)
- Los Angeles little pocket mouse (under review for federal threatened or endangered status; state species of special concern)
- Ringtail (state protected species).

In addition, Coast Live Oak trees, which are protected by Ventura County, California, are found on the site. Any work on a tree or in the ground within a protection zone surrounding the protected tree is subject to ordinance requirements. The County of Ventura is contacted before the trimming of branches or roots or grading or excavating within the root zone of a protected tree and a permit is issued as required. The services of a qualified tree trimmer may be required to oversee the activities taking place near a protected tree.

Most common species as well as sensitive species of plants and animals are not affected by exposure to low levels of radiological contamination. The territorial range of large animals limits their exposure duration at a contaminated site. The short life span of smaller animals limits the cumulative radiation dose that would be required to induce cancer.

In any event, because radiation doses to humans have been found to be very low (*see* Table 4-1), doses to plants and animals are also assumed to be very low. The impacts from those doses are unlikely to affect the population of any species.

Vegetation has been sampled throughout ETEC's operational period and DOE has continued this sampling during site cleanup activities. No evidence of any radioactive contamination in vegetation has ever been found.

No other natural resources such as timber, minerals, or rangeland are present on the site.

4.6.2 Impacts of Alternative 1 (Cleanup and Closure Under the 15 mrem Annual Dose Standard)

While implementation of Alternative 1 could have some short-term adverse effects on local plant and wildlife populations, these effects would be minimal because the actions would be limited to areas that are already highly disturbed and industrial in nature. No threatened, endangered, or sensitive species would be affected because they are not present in the areas where the work would be performed. In the long term, the remediation of Area IV would increase habitat availability, and the site may become more effective as a habitat linkage between the Santa Susana Mountains, the Simi Hills, and the Santa Monica Mountains. No other natural resources would be affected.

4.6.3 Impacts of Alternative 2 (Cleanup and Closure Using a 0.05-Millirem Annual Dose Standard)

Implementation of Alternative 2 would also have similar short-term adverse effects on local plant and wildlife populations as Alternative 1. However, these effects would be more widespread because of the additional soil remediation that would occur in Area IV. Approximately 45 acres of wildlife habitat would be disturbed under this alternative. The additional land disturbance would increase the potential for the disturbance of threatened, endangered, or sensitive plant and animal species, disturbance of migratory bird species that might roost in the area, and the introduction of non-native plant and weed species. Potential adverse impacts to threatened or endangered species would require consultation with the U.S. Fish and Wildlife Service and the preparation of a biological assessment.

Brush Fires

In 2000, a concern was raised about brush fires in and around contaminated sites at the SSFL. The concern centered on the potential for brush and vegetation growing on contaminated land to become contaminated. Subsequent fires could then result in airborne contamination, which could be a hazard to firefighters and the surrounding community.

To address this concern, comprehensive vegetation sampling was conducted in Area IV in 2000. One composite vegetation sample (a variety of vegetation at each location) was collected at each of 28 existing and legacy radiological facilities. For comparison purposes, two offsite samples were collected to determine the natural background. The only radionuclide found in the vegetation samples was naturally occurring potassium-40. No man-made radionuclides were found in either the onsite or offsite vegetation samples. This latest finding confirms the results from earlier sampling conducted at the SSFL.

4.6.4 Impacts of No Action Alternative (No Further Cleanup and Secure the Site)

Implementation of the No Action Alternative would avoid the short-term adverse effects on local plant and wildlife populations. Because the site would be maintained in its current industrial state wildlife habitat would not be improved.

4.7 CULTURAL RESOURCES

4.7.1 Current Conditions

An intensive archeological survey was conducted for Area IV in 2001 (W&S Consultants 2001). This involved (1) background studies reviewing the prehistory, ethnography, and historical land use of the study area; (2) an archival records search to determine whether any prehistoric or historical archaeological sites had been recorded or were known to exist; and (3) an on-foot survey of the study area.

This survey of the entire Area IV study area resulted in the identification and recording of four archaeological sites. Each of these is located in rocky, undeveloped areas and is associated with a rock shelter or a cave. These sites are:

- A rock painting on the back wall of a small sandstone cave, probably Euro-American in origin
- A rock shelter exhibiting fire-blackened walls and ceiling that appears to represent a small special-use area
- A single bedrock mortar located on an open boulder adjacent to a rock shelter
- A low rock shelter that contains a midden deposit and bedrock mortar (site integrity has been lost to previous artifact looting)

None of these sites are eligible for inclusion on the National Register of Historic Places. Further, the sites are all located in rocky areas that have not been developed or used during DOE operations at ETEC.

4.7.2 Impacts of Alternative 1 (Cleanup and Closure Under the 15 mrem Annual Dose Standard)

Because no remediation would occur at or near any of the four identified archaeological sites, implementation of Alternative 1 would not affect cultural resources at Area IV. Limited remediation of soil near the RMHF would not be expected to result in the discovery of as-yet-unknown archaeological or cultural resources.

4.7.3 Impacts of Alternative 2 (Cleanup and Closure Using a 0.05-Millirem Annual Dose Standard)

Because no remediation would occur at or near any of the four identified archaeological sites, implementation of Alternative 2 would not affect known cultural resources at Area IV. However, the additional land disturbance required under Alternative 2 could increase the potential for the disturbance of as-yet-undiscovered archaeological or cultural resources. Discovery of such resources during remediation would require a cessation of activities and consultation with the State Historic Preservation Officer.

4.7.4 Impacts of No Action Alternative (No Further Cleanup and Secure the Site)

Implementation of the No Action Alternative would not affect any of the four identified archaeological sites.

4.8 NOISE AND AESTHETICS

4.8.1 Current Conditions

The SSFL and Area IV are industrial areas and have sound and aesthetic characteristics typical of such areas. However, because most operational activities at Area IV have ceased, the site is frequently quiet. Because of the remote location in a relatively remote, mountainous area, no sound from normal DOE operations travels offsite. Some ETEC facilities can be seen from offsite locations.

4.8.2 Impacts of Alternative 1 (Cleanup and Closure Under the 15 mrem Annual Dose Standard)

Implementation of Alternative 1 would result in the generation of noise at levels above the current operational level. However, this would be temporary and no noise would travel offsite because of its remote location. At the conclusion of decontamination, demolition, regrading, and revegetation, the site would be restored to its natural condition.

Transportation of waste offsite would generate noise and vibrations along truck routes, particularly in the residential neighborhoods closest to the site. Approximately two trucks per day for offsite shipments of waste would travel over local roads for the 5 years required to implement Alternative 1.

4.8.3 Impacts of Alternative 2 (Cleanup and Closure Using a 0.05-Millirem Annual Dose Standard)

Implementation of Alternative 2 would result in the generation of noise at levels above the current operational level, and for a slightly longer period of time (3 years longer) than Alternative 1. However, this would be temporary and no noise would travel offsite because of its remote location. At the

conclusion of decontamination, demolition, regrading, and revegetation, the site would be restored to its natural condition.

Transportation of waste offsite would generate noise and vibrations along truck routes, particularly in the residential neighborhoods closest to the site. Approximately 27 trucks per day of offsite shipments of waste and shipments of clean soil to the site, 15 times more than Alternative 1, would travel over local roads for the 8 years required to implement Alternative 2.

4.8.4 Impacts of No Action Alternative (No Further Cleanup and Secure the Site)

Implementation of the No Action Alternative would result in no change to the current noise levels and aesthetic conditions of the site. Truck traffic in the residential neighborhoods nearest the site would not increase.

4.9 SOCIOECONOMICS

4.9.1 Current Conditions

Based on a recent demographic survey (based on census data and modified by direct observations of nearby residential areas around the SSFL site), DOE estimates that 1,403 people live within 3.2 kilometers (2 miles) of the center of the SSFL. Currently, residents live directly adjacent to the eastern and southern site boundaries, and two mobile home parks are located east of the site on Woolsey Canyon Road. According to maps and direct observation, there are no schools, nursing homes, or other facilities within 1.6 kilometers (1 mile) of the site boundary. Approximately 69,398 people live within 8 kilometers (5 miles) of the site.

The SSFL currently employs 280 people, 22 of whom are employed at ETEC.

4.9.2 Impacts of Alternative 1 (Cleanup and Closure Under the 15 mrem Annual Dose Standard)

Implementation of Alternative 1 would require approximately 40 additional workers onsite for the 5-year duration of the alternative. This slight increase in personnel would not affect socioeconomic conditions in the region.

4.9.3 Impacts of Alternative 2 (Cleanup and Closure Using a 0.05-Millirem Annual Dose Standard)

Implementation of Alternative 2 would require approximately 55 additional workers onsite for the 8-year duration of the alternative. This slight increase in personnel would not affect socioeconomic conditions in the region.

4.9.4 Impacts of No Action Alternative (No Further Cleanup and Secure the Site)

Implementation of the No Action Alternative would require no additional workers for 1 year and fewer workers (approximately 15 workers) in each subsequent year to monitor and secure the remaining ETEC buildings. This level of effort would not affect socioeconomic conditions in the region.

4.10 WASTE MANAGEMENT

4.10.1 Current Conditions

As discussed in Section 2.4, ETEC manages LLW and MLLW. LLW continues to be generated each year as a result of ongoing site closure activities. MLLW is not routinely generated.

DOE sends LLW generated at ETEC to the Nevada Test Site near Las Vegas, Nevada; the Hanford Site in Richland, Washington; or Envirocare, a commercial radioactive waste disposal facility in Clive, Utah, for disposal. DOE sends the majority of MLLW generated at ETEC to Envirocare.

Small amounts of hazardous waste are generated and disposed of in commercial, licensed hazardous waste disposal facilities in accordance with RCRA. Nonhazardous debris waste is also generated at ETEC. This type of debris includes asphalt, concrete, and building materials. Debris waste is disposed of at a local municipal sanitary landfill (Bradley Landfill).

Table 4-4 lists the waste volumes that are currently stored onsite and the volumes that were generated at ETEC in fiscal year 2001.

Table 4-4. Waste Volumes Stored and Generated

Waste Type	Volume Currently Stored Onsite (cubic meters)[a]	Volume Generated in Fiscal Year 2001 (cubic meters)
LLW	75	50
MLLW	20	5
Hazardous Waste	0	1
Nonhazardous Debris Waste	0	50

a. To convert cubic meters to cubic feet, multiply by 35.3.

4.10.2 Impacts of Alternative 1 (Cleanup and Closure Under the 15 mrem Annual Dose Standard)

Implementation of Alternative 1 would result in the generation of the following quantities of waste:

- 7,500 cubic meters (264,750 cubic feet) of LLW
- 20 cubic meters (706 cubic feet) of MLLW
- 5 cubic meters (180 cubic feet) of hazardous waste
- 25,300 cubic meters (893,500 cubic feet) of nonhazardous debris waste

Disposal of Debris and Recycling

DOE has imposed a moratorium on the unrestricted release for recycling of any metals from radiation areas within a DOE facility, pending the completion of an environmental impact statement on the disposition of radioactively contaminated scrap metals (DOE 2001a).

For former radiological facilities, DOE disposes of uncontaminated building debris (including formerly contaminated material that has been decontaminated) in municipal sanitary landfills. Before such materials can be disposed of, the legal process of "releasing a building for unrestricted use" must be completed. Completion of this process means:

- Cleanup standards have been met and verified;
- The regulatory agency imposes no further radiological controls or regulatory oversight for the building;
- The regulatory agency removes the building from the existing "Radioactive Material License;"
- The building can be used safely for any other purposes without any further radiological controls;
- The building can be demolished safely and disposed of at regular landfills without any further radiological controls; and
- Any other material from the building, including metal, can be safely reused or recycled without any further radiological controls.

Moratorium in California. Through Executive Order D-62-02 (September 30, 2002), the Governor of California imposed a moratorium on the disposal of decommissioned materials into Class III landfills and unclassified waste management units, as described in Title 27, sections 20260 and 20230, of the California Code of Regulations. The moratorium affects material from former radiological facilities. It will remain in effect until the state completes its assessment of the public health and environmental safety risks associated with the disposal of decommissioned materials and the regulations setting dose standards for decommissioning.

As discussed in Section 3.2, the volume of soil that would need to be remediated in the implementation of Alternative 1 was derived using a 1995 Area IV radiological survey (Rocketdyne 1996), the most recent characterization of all 1.2 square kilometers (290 acres) of Area IV. Soil sample data taken from the RMHF in 2000 were also used (internal Boeing data). All excavated soil would be managed as LLW.

4.10.3 Impacts of Alternative 2 (Cleanup and Closure Using a 0.05-Millirem Annual Dose Standard)

Implementation of Alternative 2 would result in the generation of following quantities of waste:

- 406,850 cubic meters (14.4 million cubic feet) of LLW[12]
- 20 cubic meters (706 cubic feet) of MLLW
- 5 cubic meters (180 cubic feet) of hazardous waste
- 25,300 cubic meters (893,500 cubic feet) of nonhazardous debris waste

[12] Most of this soil would meet DOE, DHS, NRC, and EPA cleanup standards and thus would not meet the definition of LLW. Typically, this soil would be disposed of in a municipal solid waste landfill (Class III). To address public concerns, DOE would dispose of this material at a DOE-approved LLW disposal site.

As discussed in Section 3.3, the volume of soil that would need to be remediated in the implementation of Alternative 1 was derived using a 1995 Area IV radiological survey, the most recent characterization of all 1.2 square kilometers (290 acres) of Area IV (Rocketdyne 1996). Soil sample data taken from the RMHF in 2000 were also used (internal Boeing data). All excavated soil would be managed as LLW.

4.10.4 Impacts of No Action Alternative (No Further Cleanup and Secure the Site)

Implementation of the No Action Alternative would result in the generation of minimal amounts of LLW and nonhazardous debris waste as a result of continuing monitoring and maintenance of institutional controls.

4.11 TRANSPORTATION

4.11.1 Current Conditions

As noted above, DOE ships LLW generated at ETEC to the Nevada Test Site, the Hanford Site, or Envirocare for disposal. The LLW is contained in drums or metal boxes per DOT requirements. DOE ships most MLLW generated at ETEC to Envirocare. Some MLLW is treated on site and then disposed of appropriately. Small amounts of hazardous waste are disposed of in commercial, licensed hazardous waste disposal facilities in accordance with RCRA. Nonhazardous debris waste is disposed of at local, licensed refuse disposal sites. All transportation is by truck.

Table 4-5 lists the truck shipments by waste type that occurred at ETEC in fiscal year 2001.

Table 4-5. Offsite Waste Shipments

Waste Type	Number of Truck Shipments in Fiscal Year 2001
LLW	5
MLLW	1
Hazardous Waste	0
Nonhazardous Debris Waste	20

The potential environmental impacts of transporting LLW, MLLW, and hazardous waste by truck from ETEC to authorized disposal sites has been addressed in earlier NEPA documents (*see* Section 2.4). The remainder of this section identifies the number of truck shipments of LLW, MLLW, and hazardous waste that would occur under each alternative and focuses on the potential environmental impacts of transporting nonhazardous debris waste and sodium offsite. Traffic fatalities that could occur as a result of LLW shipments and fatalities as a result of pollution from vehicle exhaust from all shipments are also reported. Air pollutant emissions that would occur as a result of the shipments are identified in Section 4.3 (*see* Appendix H for additional information on the air quality analysis).

4.11.2 Impacts of Alternative 1 (Cleanup and Closure Under the 15 mrem Annual Dose Standard)

Implementation of Alternative 1 would result in the following numbers of truck shipments:

- 553 truck shipments of LLW
- 20 truck shipments of MLLW
- 5 truck shipments of hazardous waste

- 1,860 truck shipments of nonhazardous debris waste
- 11 truck shipments of sodium (for reuse)

For LLW, hazardous waste, and nonhazardous debris waste, DOE assumed that each truckload would carry 13.6 cubic meters of waste.

LLW. The 553 truck shipments of LLW required under Alternative 1 would not be expected to result in any traffic fatalities (2.5×10^{-2} fatalities) (for purposes of analysis, DOE assumed that all LLW would be shipped to Nevada Test Site, which is the closest and currently the less expensive disposal alternative).[13] Other impacts of transporting LLW, including the impacts of an accident in which LLW is released, are addressed in the *Environmental Assessment of Off-Site Transportation of Low-Level Waste from Four California Sites* (DOE 1997c). This EA concluded that the environmental impacts (human health, traffic, air quality, noise, and environmental justice) of the transportation of LLW would be minimal.

Nonhazardous debris. The 1,860 shipments of debris waste is not expected to result in any traffic fatalities (5.7×10^{-3}) as a result of traffic accidents.

Sodium. The 197,000 liters (52, 000 gallons) of liquid sodium in the SPTF would be transferred to portable transfer vessels provided by a new owner of the sodium. DOE would build a system capable of transferring the sodium from the SPTF to the new owner's vessels. The sodium would be allowed to cool by means of heat loss through the vessel's insulation to the surrounding atmosphere and would become solid. Then the new owner would transport the solid sodium offsite.

Transportation of hazardous materials such as sodium must meet Department of Transportation shipping regulations. These regulations include requirements and specifications for shipping papers, packaging, marking, labeling, placarding, emergency response training, and route selection (*see* 49 CFR Parts 171, 172, and 178). The sodium would be transported as a solid. However, in the event of an accident involving a release of sodium, the rupture of a tank or fire may result if there were significant moisture in the air or water present.[14]

Exhaust emissions. The 2,443 truck shipments required for all shipments under Alternative 1 would result in exhaust emissions from the trucks. These emissions would not be expected to result in any fatalities (6.0×10^{-3} fatalities).

4.11.3 Impacts of Alternative 2 (Cleanup and Closure Using a 0.05-Millirem Annual Dose Standard)

Implementation of Alternative 2 would result in the following numbers of truck shipments:

[13] Traffic fatalities were calculated by applying the traffic-fatality-per-kilometer-traveled rate provided in NUREG-1496 (NRC 1997).

[14] At the time the analysis was originally conducted, the SPTF contained 197,000 liters (52,000 gallons) of liquid sodium. DOE, through its onsite contractor, has since removed all but 4,550 liters (1,200 gallons) as part of its ongoing cleanup activities at the site. Removal of the remaining volume of sodium would require 4 shipments, rather than the 11 shipments analyzed. Because the volume of sodium to be removed and the number of shipments required are substantially less than were analyzed, the environmental impacts that could occur as a result of removing and transporting this material would be correspondingly less than those noted in this document. In addition, this document analyzes the removal and transportation of solid sodium, a chemical that is highly reactive with water. The remaining 4,550 liters (1,200 gallons) of sodium would be converted into liquid sodium hydroxide (lye), which is far less hazardous than solid sodium.

- 30,000 truck shipments of LLW
- 20 truck shipments of MLLW
- 5 truck shipments of hazardous waste
- 1,860 truck shipments of nonhazardous debris waste
- 11 truck shipments of sodium (for reuse)

For LLW, hazardous waste, and nonhazardous debris waste, DOE assumed that each truckload would carry 13.6 cubic meters of waste. In addition, approximately 26,000 shipments of clean soil would have to be brought to the site as backfill for revegetation.

LLW. DOE assumed that all of the soil excavated under Alternative 2 would be disposed of as LLW, although much of it could be considered to be clean soil. The 30,000 truck shipments of LLW required under Alternative 2 could result in 1.4 traffic fatalities (for purposes of analysis, DOE assumed that all LLW would be shipped to Nevada Test Site, which is the closest and currently the less expensive disposal alternative). Other impacts of transporting LLW, including the impacts of an accident in which LLW is released, are addressed in the *Environmental Assessment of Off-Site Transportation of Low-Level Waste from Four California Sites* (DOE 1997c). This EA concluded that the environmental impacts (human health, traffic, air quality, noise, and environmental justice) of the transportation of LLW would be minimal.

Nonhazardous debris waste. The consequences of an accident involving shipments of nonhazardous debris waste would be the same as those described for Alternative 1.

Sodium. The consequences of an accident involving a shipment of sodium would be the same as those described for Alternative 1.

Exhaust emissions. The 31,807 truck shipments required for all shipments under Alternative 2 would result in exhaust emissions from the trucks. These emissions would not be expected to result in any fatalities (0.23 fatalities).

4.11.4 Impacts of No Action Alternative (No Further Cleanup and Secure the Site)

Implementation of the No Action Alternative would result in fewer than five truck shipments of LLW and nonhazardous debris waste to offsite disposal sites annually. No impacts would be expected.

4.12 ENVIRONMENTAL JUSTICE

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

In February 1994, the President issued Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 Fed. Reg. 7629 (1994)). This Order directs federal agencies to incorporate environmental justice as part of their missions. As such, federal agencies are specifically directed to identify and address as appropriate disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations.

The Council on Environmental Quality has issued guidance to federal agencies to assist them with their NEPA procedures so that environmental justice concerns are effectively identified and addressed (*Guidance for Considering Environmental Justice Under the National Environmental Policy Act* [CEQ 1997]). In this guidance, the Council encouraged federal agencies to supplement the guidance with their own specific procedures tailored to particular programs or activities of an agency. DOE has prepared a document titled *Draft Guidance on Incorporating Environmental Justice Considerations into the Department of Energy's National Environmental Policy Act Process* (DOE 2000a). DOE's draft guidance is based on Executive Order 12898 and the Council on Environmental Quality environmental justice guidance.

Among other things, the DOE draft guidance states that even for actions that are at the low end of the sliding scale with respect to the significance of environmental impacts, some consideration (which could be qualitative) is needed to show that DOE considered environmental justice concerns. DOE needs to demonstrate that it considered apparent pathways or uses of resources that are unique to a minority or low-income community before determining that, even in light of these special pathways or practices, there are no disproportionately high and adverse impacts on the minority or low-income population. The DOE draft guidance also defines "minority population" as a demographic composition of the populace where either the minority population of the affected area exceeds 50 percent or the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population.

For this EA, DOE applied the draft environmental justice guidance to determine whether there could be any disproportionately high and adverse human health or environmental impacts on minority or low-income populations surrounding ETEC as a result of the implementation of any of the alternatives analyzed. Analysis of environmental justice concerns was based on an assessment of the impacts reported in Sections 4.1 through 4.11. Although no high and adverse impacts were identified, DOE considered whether minority or low-income populations would be disproportionately affected by the alternatives.

There are no minority or low-income populations immediately adjacent to ETEC or the SSFL. The primary impact to the area around the SSFL would be a temporary increase in car and truck traffic.[15] This increase in traffic would be noticeable only in the immediate area, where no minority or low-income populations have been identified. Because no other offsite impacts are anticipated, DOE believes that no minority or low-income populations would be disproportionately affected by the alternatives.

4.13 MITIGATION

The results of the environmental analysis conducted for this EA indicate that implementation of Alternative 1 or 2 would not result in significant environmental impacts. However, DOE would use standard practices to further reduce the environmental impacts of these alternatives. These practices would include:

- Dust suppression, sediment controls, personnel protective equipment, monitoring, and compliance with safety and health plans to reduce radiation exposure to workers and the public through the air pathway

- Protection of undiscovered cultural resources by compliance with established operating procedures regarding preservation of archaeological sites (if such resources are discovered, excavation or other activities would stop until all required steps were taken to preserve the resource)

[15] The increase in traffic would occur over a period of 5 to 8 years, depending on the alternative selected. Car traffic would increase due to onsite workers commuting to ETEC. Truck traffic would increase due to offsite shipment of waste and shipment of uncontaminated soil to the site if needed for Alternative 2.

- Protection of sensitive plant species by adherence to established operating procedures, including hiring a qualified tree trimmer to oversee the activities taking place near a protected tree

- Limitations on transportation hours, trucks per hour, and trucks per day to reduce impacts to roads and neighborhoods; implementation of traffic control and loading procedures that address local traffic hazards, noise restrictions, city/county approval, manifesting, dust suppression, truck decontamination, environmental monitoring, container cover, truck inspection, and spill/release control

- Compliance with Department of Transportation shipping requirements (including proper packaging; limitations on waste quantities per shipment; and preparation of and compliance with spill prevention, control, and cleanup plans) to protect transportation workers and the public from exposure to contaminants in the waste

- Maintenance of sediment control structures and related access restrictions to prevent additional migration of mercury

- Continuation of institutional controls and pump-and-treat systems to protect the public from potential exposure to TCE through the groundwater pathway

4.14 CUMULATIVE IMPACTS

Council on Environmental Quality regulations implementing the procedural provisions of NEPA require federal agencies to consider the cumulative impacts of a proposal (40 CFR 1508.25(c)). A cumulative impact on the environment is the impact that results from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7). This type of assessment is important because significant cumulative impacts can result from several smaller actions that by themselves do not have significant impacts. The relatively few truck shipments over 5 years under Alternative 1 (2,443 truck shipments or an additional 2 trucks per day for 5 years) in comparison to other radioactive waste and materials shipments and truck shipments generally would not pose cumulatively significant environmental impacts in the local area or in the southern California region. Implementation of Alternative 2, which would require 56,000 truck shipments over 8 years (or approximately 27 additional trucks per day over that period of time) for offsite transportation of waste and transport of clean soil to the site, would not impose cumulatively significant environmental impacts when considered in combination with other truck shipments in the region, although this amount of truck traffic on the roads near ETEC could impose a hardship on local residents.

ETEC is located in a remote area with no other major industrial or commercial centers surrounding it. Thus, there is no potential for cumulative impacts from other present or reasonably foreseeable future actions. However, an important consideration in whether residual contamination, from both radiological and chemical constituents, could pose a cumulative risk to future users of the site, particularly residential use where multiple pathways would exist (e.g. direct contact soils, and migration of groundwater).

Cleanup of the chemical contamination will be conducted pursuant to RCRA corrective action program. For the purpose of this analysis, DOE assumes that the cleanup of chemical contamination on the SSFL will result in a residual cancer risk, from all pathways of between 1×10^{-4} and 1×10^{-6}, as required by EPA. Because any residual radioactive contamination from the DOE's cleanup will be in areas away from the chemical contamination, and the inability for a receptor to be in direct contact with separate portions of the site at the same time, an unacceptable cumulative risk from soils would not be expected to occur.

It is also DOE's assumption that groundwater will be remediated to within the acceptable risk range, or access to that groundwater will be restricted, if it is not. Therefore, given the low radiological risk projected to remain after implementing the 15 mrem plus ALARA annual dose alternative (most of Area IV is already at or below 2×10^{-6}); or, the 0.05 mrem annual dose alternative (1×10^{-6}), the only feasible way an unacceptable cumulative risk would occur is if the chemical contamination was not properly remediated or controlled. Furthermore, Cs^{137}, the principal radiological constituent of concern has a relatively short half-life. Thus, the residual risk would continue to decline over time.